

-46-

PCT/US99/29666

What is claimed is:

1. A composition comprising lithium (Li) and metal (M) cation exchanged zeolite wherein said cation exchanged zeolite is selected from the group consisting of Li_xM_yX zeolite, Li_xM_yLSX zeolite, wherein said metal (M) cation has a valence state of +1 and is selected from the group consisting of Ag^+ , Cu^+ , and mixtures thereof, wherein the metal cation is in the form of dispersed clusters, further wherein the metal cation is presented in an atomic amount corresponding to up to about 10% of the cation sites, and wherein x is greater than y , the sum of $x + y$ is less than or equal to the number of cation sites of said zeolite, and y is greater than zero.

2. (Cancel)

2 ~~3~~. The composition of claim 1 wherein M is silver.

3 ~~4~~. The composition of claim 1 wherein the total number of said cation sites is 96, and Y is up to 20.

4 ~~5~~. The composition of claim 1 wherein the total number of said cation sites is 96 and Y is up to 10.

5 ~~6~~. The composition of claim 2 which is cation exchanged sodium zeolite where sodium is present in an atomic amount less than said silver.

6 ~~7~~. The composition of claim 5 wherein the total number of cation sites is 96, lithium is present in an atomic amount greater than 70 and less than 96 atomic units, silver is present in an atomic amount greater than 0 and up to about 20 atomic units, and sodium is present in an atomic amount less than silver.

-47-

PCT/US99/29666

⁷ 8. The composition of claim 1 wherein said clusters consist of partially metallic silver.

⁷ 8. The composition of claim ~~8~~ wherein said clusters consist of n atoms of metal (M) collectively having a charge represented by the value n-1.

⁸ 10. The composition of claim ~~9~~ wherein said clusters consist of 3 atoms of metal (M) collectively having a +2 charge, or 6 atoms of metal (M) collectively having a +5 charge.

¹⁰ 11. The composition of claim 1 wherein said clusters consist of one selected from the group consisting of partially metallic copper and partially metallic silver.

12. (Cancel)

¹¹ 13. The composition of claim 1 wherein M is copper.

¹¹ 12 14. The composition of claim ~~13~~ which is cation exchanged sodium zeolite where sodium is present in an atomic amount less than said copper.

¹² 13 15. The composition of claim ~~14~~ wherein the total number of cation sites is 96, lithium is present in an atomic amount greater than 70 and less than 96 atomic units, copper is present in an atomic amount greater than 0 and up to about 20 atomic units, and sodium is present in an atomic amount less than copper.

¹⁴ 16. A process for selectively adsorbing nitrogen from a gas mixture thereof which comprises the step of contacting said gas mixture with an adsorbent which comprises lithium (Li) and metal (M) cation exchanged zeolite, wherein said zeolite is selected from the group consisting of Li_xM_y X zeolite and Li_xM_y LSX

AMENDED SHEET

- 48 -

PCT/US99/29666

zeolite, wherein said metal (M) cation has a valence state of +1 and is selected from the group consisting of Ag^+ , Cu^+ , and mixtures thereof, wherein the metal cation is in the form of dispersed clusters, further wherein the metal cation is presented in an atomic amount corresponding to up to about 10% of the cation sites, and wherein x is greater than y , the sum of $x + y$ is less than or equal to the number of cation sites of said zeolite, and y is greater than zero.

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~~15~~ 17. The process of claim ~~16~~ wherein said zeolite is a lithium and silver exchanged sodium zeolite, said method further comprising the steps of:

contacting said gaseous mixture with said zeolite at a selected temperature and pressure, thereby producing a non-adsorbed component and a nitrogen-rich adsorbed component; and

changing at least one of said pressure and temperature to thereby release said nitrogen-rich component from said adsorbent.

¹⁴
~~16~~ 18. A process for preparing a composition comprising lithium and metal (M) cation exchanged zeolite where M is in the form of dispersed clusters associated with a plurality of said cation exchanged sites, said method comprising the steps of:

a. providing a sodium zeolite selected from the group consisting of Na-X zeolite and Na-LSX zeolite;

b. exchanging a plurality of Na^+ ions with Li^+ ions;

c. exchanging a portion of said Li^+ ions with M^+ ions, wherein the M^+ is presented in an atomic amount corresponding to up to about 10% of the cation sites;

d. heat treating the M^+ exchanged zeolite of step (c) at a temperature of greater than about 400 degrees centigrade in a non-oxidizing atmosphere to

05-01-2001

US 009929666

-49-

PCT/US99/29666

reduce a portion of said M^{1+} ions to M^0 , thereby forming said dispersed clusters.

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~~17~~ ¹⁶ 18. The process of claim ~~18~~ wherein in step (c) M^{1+} is Ag^{1+} , and step (d) is conducted at a temperature in a range of about 450° to about $500^\circ C$.

~~18~~ ¹⁶ 20. The process of claim ~~18~~ wherein M^{1+} is Cu^{1+} and step (c) is conducted by first exchanging Li^{1+} ions with Cu^{2+} ions and then reducing said Cu^{2+} ions to Cu^{1+} ions.

~~19~~ ¹⁶ 21. The process of claim ~~18~~ wherein in step (d) the non-oxidizing atmosphere is an inert atmosphere or a vacuum.

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